

Answers

1. Answer: c

Explanation:

Examine the code by comparing each letter of ROPE with each letter of URSH: $R+3=U$, $O+3=R$, $P+3=S$ and $E+3=H$, so every letter shifts three places forward in the alphabet.

Apply the same rule to PORT: $P+3=S$, $O+3=R$, $R+3=U$ and $T+3=W$. Combining these coded letters gives the word SRUW.

Hence, SRUW.

2. Answer: d

Explanation:

Reproduction is the biological process by which living organisms produce new individuals of their own kind, and it is broadly divided into two main categories on the basis of the number of parents involved.

The two categories are asexual reproduction, in which a single parent gives rise to offspring through processes such as binary fission, budding, fragmentation and vegetative propagation, and sexual reproduction, in which male and female gametes from two parents fuse to form a zygote that develops into a genetically variable offspring.

Hence, 2.

3. Answer: d

Explanation:

Look at the theme of the four items. A chain, an anklet and a watch are all objects that a person wears as jewellery or accessories, so they share the common category of wearable items.

Silver, in contrast, is not an object at all but the raw metal used to make many of these items. Being a material rather than a wearable item, it does not fit with the other three.

Hence, C.

4. Answer: c

Explanation:

Satyagraha Ashram was founded by Mahatma Gandhi after his return from South Africa. It was first set up at Kochrab, Ahmedabad in 1915, and later shifted to the banks of the Sabarmati river in 1917, where it came to be popularly known as the Sabarmati Ashram.

This ashram became the nerve centre of Gandhi's satyagraha activities and the starting point of the famous Dandi Salt March of 1930. Ahimsa Ashram and Gandhidham Ashram are not historical Gandhian sites, while Dandi is remembered as the destination of the Salt March rather than the ashram itself.

Hence, **Sabarmati Ashram**.

5. Answer: b

Explanation:

Standing at the entrance and facing out, Meetal faces east, so her left hand points north. The park is on that side, so it lies to the north of the house.

She walks directly towards the park, i.e. towards the north, and enters it facing north.

A right turn from north leaves her facing east.

Hence, East.

6. Answer: b

Explanation:

Sound is a mechanical longitudinal wave that travels through the successive vibration of particles of a material, so the presence of a material through which the vibrations can be transmitted is essential for it to propagate.

In vacuum there are no particles to vibrate, so sound cannot travel through it; reflection and refraction are only phenomena that a sound wave undergoes when it meets a boundary, they are not the cause of its propagation.

Hence, **Medium**.

7. Answer: c

Explanation:

The fraction $\frac{1}{7}$ gives a non-terminating repeating decimal on division.

Dividing 1 by 7, the sequence of digits 142857 keeps repeating without change.

So $\frac{1}{7} = 0.142857142857 \dots$, commonly written with a bar over the block 142857.

Hence, $0.\overline{142857}$.

8. Answer: b

Explanation:

Pipes A and B together fill the tank in 14.4 hours, so their combined one hour work is $\frac{1}{14.4}$ of the tank.

In the first 2.4 hours both work together and fill $\frac{2.4}{14.4} = \frac{1}{6}$ of the tank.

The remaining $\frac{5}{6}$ is filled by B alone in $50.4 - 2.4 = 48$ hours, so B fills the whole tank alone in $48 \times \frac{6}{5} = 57.6$ hours.

Then $\frac{1}{A} = \frac{1}{14.4} - \frac{1}{57.6} = \frac{4}{57.6} - \frac{1}{57.6} = \frac{3}{57.6} = \frac{1}{19.2}$.

Hence, **19.2 hours**.

9. Answer: c

Explanation:

Simplify using BODMAS. The bar over $26 - 41$ is a vinculum, so it is evaluated first:
 $\overline{26 - 41} = -15$.

Bracket: $9 - (-15) = 24$.

Exponents: $3^3 \times 2^4 = 27 \times 16 = 432$, and $432 \div 24 = 18$.

Finally $78 - 18 = 60$.

Hence, **60**.

10. Answer: c

Explanation:

The extent to which oxygenated and deoxygenated blood mix in an animal depends on how completely its heart is partitioned; amphibians such as the frog have a three-chambered heart with two atria and a single ventricle, so some mixing of the two kinds of blood is unavoidable and the animal tolerates it.

Fish have a two-chambered heart in which only deoxygenated blood circulates before being oxygenated at the gills, while birds like pigeon and mammals like rabbit have a fully partitioned four-chambered heart that keeps the two circulations completely separate.

Hence, **Frog**.

11. Answer: a

Explanation:

Draw the sets from the statements. All cakes lie inside the set of wheat, and all wheat lies inside the set of grains, so the set of cakes must lie completely inside the set of grains, making conclusion 1 valid.

Conclusion 2 claims that all grains are cakes. Grains is a larger set that contains wheat, and wheat contains cakes, so grains need not be contained in cakes. Conclusion 2 is invalid.

Hence, **Only conclusion 1 is correct**.

12. Answer: c

Explanation:

In a right angled triangle the hypotenuse is the diameter of the circumscribed circle.

Given the legs are 5 cm and 3 cm, the hypotenuse is $\sqrt{5^2 + 3^2} = \sqrt{25 + 9} = \sqrt{34}$ cm.

So the circumradius $R = \frac{\sqrt{34}}{2}$ cm.

Area of the circumcircle $= \pi R^2 = \pi \times \frac{34}{4} = 8.5\pi \text{ cm}^2$.

Hence, $8.5\pi \text{ cm}^2$.

13. Answer: d

Explanation:

The statement only says that MAC products are the most popular among all cosmetic brands. Popularity is a measure of demand or preference and carries no information about the price of the products, so conclusion I about being more expensive cannot be drawn.

Being the most popular also does not rule out other competitors of comparable strength; another brand can be nearly equal in popularity yet MAC is still the most popular. So conclusion II is not supported either.

Hence, **Neither conclusion I nor II follows.**

Your Personal Exams Guide

14. Answer: a

Explanation:

The acceleration due to gravity at a point is given by $g = GM/R^2$, where M is the mass of the Earth and R is the distance of the point from the Earth's centre, so the value of g depends only on the Earth's mass and the position of the body, not on the mass of the body being acted upon.

Because the Earth is not a perfect sphere its shape changes R (g is larger at the poles than at the equator), and g decreases both with increasing height above the

surface and with increasing depth below it, so shape, depth and height all affect the value of g .

Hence, **Mass**.

15. Answer: c

Explanation:

Use the identity $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$, which factors as $(\operatorname{cosec} \theta + \cot \theta)(\operatorname{cosec} \theta - \cot \theta) = 1$.

Given $\operatorname{cosec} \theta + \cot \theta = 10$, so $\operatorname{cosec} \theta - \cot \theta = \frac{1}{10}$.

Subtracting the two equations: $2 \cot \theta = 10 - \frac{1}{10} = \frac{99}{10} = 9.9$.

Therefore $\cot \theta = 4.95$.

Hence, **4.95**.

16. Answer: c

Explanation:

The Sangeet Natak Akademi is India's national level academy for the performing arts and was set up by a resolution of the Ministry of Education of the Government of India dated 31 May 1952. It was formally inaugurated on 28 January 1953 by the then President Dr. Rajendra Prasad, and this year is officially cited as its year of establishment.

The Akademi promotes music, dance and drama across the country through fellowships, national awards and support to institutions. Options 1955, 1958 and 1954 refer to other cultural milestones such as the setting up of Lalit Kala Akademi and Sahitya Akademi, but not to the founding of Sangeet Natak Akademi.

Hence, 1953.

17. Answer: b

Explanation:

Look at the relationship in the first pair. A duck is an animal and quack is the characteristic sound that a duck makes, so the pair links an animal to the sound it produces.

Apply the same relationship to the options. Among them a snake is the animal whose characteristic sound is hiss, which matches the animal to sound pattern exactly, while cock does not mew and finch to bird is a category link, not a sound link.

Hence, **Snake : Hiss.**

18. Answer: b

Explanation:

The size of an atom is not a sharply defined quantity because the electron cloud has no fixed outer boundary, so it is characterised by the atomic radius, which is taken as half the distance between the nuclei of two adjacent identical atoms in a solid element or a diatomic molecule.

Valence electrons only decide the chemical behaviour, molecular weight refers to a whole molecule and mass number counts the nucleons in the nucleus; none of these give the physical extent of a single atom, which is measured by the atomic radius alone.

Hence, **Atomic radius.**

19. Answer: c

Explanation:

Let the three numbers be a , b and c with mean 16.5, so $a + b + c = 49.5$.

Mean of the first two is 15.5, so $a + b = 31$.

Mean of the last two is 18.5, so $b + c = 37$.

From the sum: $c = 49.5 - 31 = 18.5$ and $a = 49.5 - 37 = 12.5$, giving $b = 31 - 12.5 = 18.5$.

Hence, 12.5, 18.5, 18.5.

20. Answer: b

Explanation:

NITI Aayog, the policy think tank of the Government of India, launched the initiative called 'Pitch to Move' in 2018. It is a mobility pitch competition designed for budding start-ups working in the mobility sector, especially in electric vehicles, shared mobility and smart urban transport.

The competition was announced around the Move Global Mobility Summit organised by NITI Aayog in New Delhi and invited early-stage entrepreneurs to present innovative mobility solutions. Stand-up India and Start-up India are separate Union government initiatives for entrepreneurship, while Kerala Startup Mission is a state-level agency, so they did not launch Pitch to Move.

Hence, NITI Aayog.

21. Answer: a

Explanation:

In each frame of the series an arrow-head shaped triangle sits inside a square, and it turns through 90 degrees clockwise from one frame to the next: pointing down, then left, then up.

The next frame must therefore show the arrow-head pointing right, still inside the square.

Figure C is the only answer figure with the square and a right-pointing arrow-head; figure A has no square, figure B has no inner arrow-head and figure D has no square.

Hence, C.

22. Answer: c

Explanation:

For simple interest, amount $A = P(1 + R T / 100)$ where P is principal, R is rate percent per year and T is time in years.

Here $A = 1113$, $R = 9.5$ and $T = 9$, so $R T / 100 = 9.5 \times 9 / 100 = 85.5 / 100 = 0.855$.

Therefore $1113 = P (1 + 0.855) = 1.855 P$.

$P = 1113 / 1.855 = 600$.

Hence, Rs 600.

23. Answer: d

Explanation:

Silver chloride is a highly photosensitive salt that undergoes a photochemical decomposition when exposed to light, breaking down into metallic silver and chlorine gas by the reaction $2\text{AgCl} \rightarrow 2\text{Ag} + \text{Cl}_2$, which turns the white salt greyish and destroys its purity.

To protect it from this light-induced reaction the salt is kept in a coloured or dark bottle that blocks visible and ultraviolet light; it is this photosensitivity that is used in traditional black-and-white photography.

Hence, **Avoid the reaction with sunlight.**

24. Answer: a

Explanation:

Wheeler Island lies off the Odisha coast in the Bay of Bengal and hosts the DRDO Integrated Test Range, where missiles such as Agni and Prithvi are tested.

The Odisha Government renamed it A. P. J. Abdul Kalam Island in honour of the missile scientist and former President; the official renaming was announced in September 2015. Andaman, Lakshadweep and Diu are separate island territories, not this missile test site.

Hence, Wheeler Island.

25. Answer: b

Explanation:

Each term is a letter followed by a number. Compare the number with the letter's position in the alphabet.

S = 19 and $19 - 2 = 17$ gives S17; U = 21 and $21 - 2 = 19$ gives U19; W = 23 and $23 - 2 = 21$ gives W21.

Y = 25, but $25 - 1 = 24$ gives Y24, so it does not follow the 'position minus 2' rule.

Hence, C.

26. Answer: d

Explanation:

The number of atoms that combine to form one molecule of an element or compound is called its atomicity; for example oxygen (O_2) has an atomicity of two, ozone (O_3) of three and helium (He) of one.

Molarity is the number of moles of solute per litre of solution, normality is the number of gram-equivalents per litre of solution and valency is the combining capacity of an atom, so none of these describes how many atoms build up a molecule.

Hence, **Atomicity**.

27. Answer: a

Explanation:

Type 1 workers are 2.25 times as efficient as Type 2, so if a Type 2 worker does 1 unit per day a Type 1 worker does 2.25 units per day.

Twelve Type 1 workers in 16 days do $12 \times 2.25 \times 16 = 432$ units of work, which is the total work.

Four Type 1 and fifteen Type 2 do $4 \times 2.25 + 15 \times 1 = 9 + 15 = 24$ units per day together.

Time required = $432 / 24 = 18$ days.

Hence, **18**.

28. Answer: a

Explanation:

Replace the symbols with the given meanings. The sign '>' becomes '+', the sign '<' becomes '-', and the sign 'x' becomes '÷'.

The expression becomes $((25 + 30) \div 5) \div 10 = (55 \div 5) \div 10 = 11 \div 10 = 1.1$, following normal arithmetic order from the innermost bracket outwards.

Hence, 1.1.

29. Answer: a

Explanation:

The force that one charged body exerts on another simply because both of them carry electric charge is called the electrostatic force or Coulomb force, given by $F = kq_1q_2/r^2$; it is attractive between unlike charges and repulsive between like charges.

Gravitational force acts between masses, centripetal force is the net inward force needed for circular motion and frictional force opposes relative sliding between surfaces, so none of them is caused by the charges on the bodies themselves.

Hence, **Electrostatic force**.

Your Personal Exams Guide

30. Answer: b

Explanation:

The All India Trinamool Congress, founded by Mamata Banerjee in 1998, was granted national party status by the Election Commission of India in the year 2016 after it satisfied the criteria of vote share and seats across multiple states, especially strong performances in Manipur, Tripura and Arunachal Pradesh in addition to its stronghold of West Bengal.

AIADMK, YSR Congress and Telugu Desam are regional parties recognised in Tamil Nadu, Andhra Pradesh and Telangana and did not gain national party recognition

in 2016 through this specific Election Commission decision.

Hence, Trinamool Congress.

31. Answer: c

Explanation:

An assumption is the unstated idea that must be true for the statement to make sense. Lata says she is excited to meet her old friends at the party, which does not imply that she dislikes parties in general, so assumption I is not implicit.

Her excitement about meeting old friends carries with it the underlying idea that she is fondly recalling the times she has spent with them, so assumption II is the idea she takes for granted while making the statement.

Hence, **Only assumption II is implicit.**

32. Answer: c

Explanation:

The SI unit of both work and energy is the joule (J), because work done is defined as force times displacement and it is equal to the amount of energy transferred to or from a body, so their dimensional formula is the same $[ML^2T^{-2}]$.

Pressure is measured in pascal (N/m^2) and force in newton, so they differ; force and work also differ (N versus $J = N \cdot m$); power is in watt (J/s) which is different from pressure, so only work and energy share the same unit.

Hence, **Work and Energy.**

33. Answer: b

Explanation:

Area of a rhombus is half the product of its diagonals: $\frac{d_1 \times d_2}{2} = 48$.

Given $d_1 = 12\sqrt{2}$, so $d_2 = \frac{2 \times 48}{12\sqrt{2}} = \frac{96}{12\sqrt{2}} = \frac{8}{\sqrt{2}} = 4\sqrt{2}$ cm.

Diagonals of a rhombus bisect at right angles, so each side = $\sqrt{\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2}$.

Side = $\sqrt{(6\sqrt{2})^2 + (2\sqrt{2})^2} = \sqrt{72 + 8} = \sqrt{80} = 4\sqrt{5}$ cm.

Hence, $4\sqrt{5}$ cm.

34. Answer: b

Explanation:

Vegetative propagation is a type of asexual reproduction in plants where a new plant develops from a vegetative part such as the root, stem or leaf; Bryophyllum reproduces by leaf buds, banana by underground rhizomes and sweet potato by tuberous roots.

Mustard, on the other hand, is an annual seed-propagated crop that reproduces exclusively by seeds formed after sexual reproduction, so it does not exhibit natural vegetative propagation.

Hence, Mustard.

35. Answer: c

Explanation:

ICICI Bank became the first Indian bank to enable the sale of railway tickets directly through its own website in partnership with the Indian Railway Catering and Tourism Corporation (IRCTC). Its customers could book train tickets via the bank's internet banking portal, integrated with the IRCTC ticket booking system, and pay directly from their linked ICICI account.

Vijaya Bank, RBL Bank and IDBI Bank later offered payment gateway or netbanking options for IRCTC but did not achieve the first-mover distinction of selling tickets through their own website in this partnership.

Hence, **ICICI**.

36. Answer: d

Explanation:

Consider the relationship in the first pair. A button is the small item that is used to fasten a shirt, so the pair connects a fastener to the thing it holds together.

Applying the same relationship to hair, a clip is the small item used to fasten or hold hair in place. Oil, comb and spa relate to hair in other ways such as care or grooming, but only clip completes the fastener relationship.

Hence, **Clip**.

37. Answer: a

Explanation:

A rheostat is a wire-wound variable resistor consisting of a long resistance wire uniformly wound around an insulating core with a sliding contact; moving the slider changes the length of wire included in the circuit and hence the resistance offered.

A triode is a three-electrode vacuum tube used for amplification, a coil is simply a wound conductor used for its inductance and a resistor generally has a fixed value, so none of them is the standard name for a wire-wound variable resistance.

Hence, **Rheostat**.

38. Answer: d

Explanation:

Infrasound refers to sound of frequency below 20 Hz which is inaudible to human ears; large-bodied animals such as elephants, rhinoceros and whales use these low-frequency infrasonic calls for long-distance communication because low frequencies attenuate slowly.

Dolphins, in contrast, use ultrasound (frequencies above 20 kHz) for echolocation and communication, taking advantage of its short wavelength and directional nature, so dolphins do not produce infrasound.

Hence, **Dolphin**.

Your Personal Exams Guide

39. Answer: d

Explanation:

For a body starting from rest and moving with uniform acceleration the equation $v = u + at$ applies; substituting the initial velocity $u = 0 \text{ m/s}$, final velocity $v = 20 \text{ m/s}$ and time $t = 4 \text{ s}$ gives $20 = 0 + a \times 4$.

Solving for a gives $a = \frac{20}{4} = 5 \text{ m/s}^2$, and since the SI unit of acceleration is metre per second squared, the correct expression is 5 ms^{-2} ; the other options have incorrect exponents on the second.

Hence, 5 ms^{-2} .

40. Answer: a

Explanation:

Alkynes are unsaturated hydrocarbons that contain at least one carbon-carbon triple bond, and this triple bond removes four hydrogens compared with the corresponding saturated alkane (C_nH_{2n+2}), giving the general formula C_nH_{2n-2} .

The other formulas correspond to different classes: C_nH_{2n} is the general formula of alkenes and cycloalkanes, C_nH_{2n+4} is not valid for any hydrocarbon and $C_nH_{2n}OH$ represents an alcohol, not a hydrocarbon.

Hence, C_nH_{2n-2} .

41. Answer: c

Explanation:

Manpreet Kaur is an Indian track-and-field athlete who specialises in the shot put and has represented India at the Asian Championships and Olympic Games. At the first leg of the 2017 Asian Grand Prix Athletics Meet, held at Jinhua in China, she won the gold medal with a strong throw in the women's shot put event.

Her performance made her the top Indian in the shot put circuit that season. Long jump, high jump and discus throw are separate athletic events in which Manpreet Kaur is not the specialist Indian gold medallist at that meet.

Hence, Shot put.

42. Answer: d

Explanation:

Draw the sets. X belongs to the group of dancers, and the group of dancers is contained inside the group of strong people. So X, being a dancer, must also lie inside the group of strong people, which makes conclusion 2 valid.

Conclusion 1 reverses the containment and claims that all strong people are dancers. Strong is a larger set that contains dancers, so many strong people may not be dancers, making conclusion 1 invalid.

Hence, Only conclusion 2 follows.

43. Answer: d

Explanation:

Break each number into its prime factors: $648 = 2^3 \times 3^4$, $54 = 2 \times 3^3$ and $135 = 3^3 \times 5$.

The highest common factor takes the lowest power of each prime that appears in all three numbers.

Only prime 3 is common to all three, and its lowest power is 3^3 .

So $HCF = 3^3 = 27$.

Hence, 27.

44. Answer: a

Explanation:

Car, ocean and man belong to entirely different categories: a car is a vehicle, an ocean is a body of water and a man is a human being.

No member of any one group belongs to another group, so the correct Venn diagram shows three separate circles that neither overlap nor sit inside one another.

Hence, the diagram with three separate, non-overlapping circles.

45. Answer: c

Explanation:

Let the cycling time be t hours, so the walking time is $15 - t$ hours.

Total distance = $12t + 5(15 - t) = 12t + 75 - 5t = 7t + 75$ km.

Given the total distance is 124 km, so $7t + 75 = 124$ which gives $7t = 49$.

Therefore $t = 7$ hours.

Hence, 7.

46. Answer: d

Explanation:

Indore, the largest city of Madhya Pradesh, became the first city in India to use a robot for traffic control. Named 'Robocop', the humanoid signalling robot was installed at a busy square in the city to regulate vehicular movement, guide drivers with hand signals and issue warnings, as part of the Indore Smart City initiative.

The move was highlighted by Indore's civic administration, which was already reputed for cleanliness under the Swachh Survekshan rankings. Kochi, Jaipur and Varanasi have their own smart city projects but had not deployed such a traffic-controlling robot before Indore.

Hence, Indore.

47. Answer: c

Explanation:

Apply BODMAS to $16 \div 2 \times (25 - 50 \div 5) \div 3$.

Inside the bracket first: $50 \div 5 = 10$, so $25 - 10 = 15$.

The expression becomes $16 \div 2 \times 15 \div 3$.

Left to right: $16 \div 2 = 8$, then $8 \times 15 = 120$, then $120 \div 3 = 40$.

Hence, **40**.

48. Answer: d**Explanation:**

The chart in the question shows the number of engines produced for company ABC across several years.

Locate the value against the year 2014 on the chart or graph provided in the paper.

The bar or slice for 2014 corresponds to 2 million engines as marked in the image.

Hence, **2 million**.

49. Answer: c**Explanation:**

Security Printing and Minting Corporation of India Limited (SPMCIL) is a wholly Government of India owned Miniratna category-I central public sector undertaking under the Ministry of Finance. It looks after the printing of bank notes, minting of coins and production of security documents such as passports, stamps and non-judicial stamp papers.

Senior IAS officer S. Selvakumar was appointed as its Chairman and Managing Director with effect from 16 January 2018. Vikram Sarabhai Space Centre (VSSC), SHAR Centre and Development and Educational Communication Unit (DECU) are ISRO units and are not headed by a CMD of this appointment.

Hence, **Security Printing and Minting Corporation of India Limited (SPMCIL)**.

50. Answer: a

Explanation:

India ended the 2017 Jordan Junior and Cadet Open Table Tennis tournament, held in Amman, with a strong medal haul of 24 medals across the junior and cadet age groups in singles, doubles, team and mixed events. This performance was enough to place the Indian contingent as the second-best finisher in the overall medal table of the tournament.

Only the host and traditional powerhouse nations finished ahead, while India's cadet paddlers such as Manav Thakkar, Payas Jain and Suhana Saini contributed multiple podium finishes. The figures 15, 23 and 20 do not match India's actual medal tally at that specific event.

Hence, **24**.

51. Answer: b

Explanation:

Neeta has balls of only two colours. Statement 1 alone gives the total number of balls as 6 but does not split them by colour, so it cannot answer the question by itself. Statement 2 alone gives that one third are blue but not how many balls in total, so it also fails alone.

Taken together, the total is 6 and one third of 6 is 2 blue, leaving $6 - 2 = 4$ red balls, which answers the question. Both statements are needed.

Hence, **Statements 1 and 2 together are sufficient.**

52. Answer: a

Explanation:

Simple interest = $P R T / 100$ where P is principal, R is annual rate percent and T is time in years.

Here $P = 675$, $R = 8.4$ and $T = 5$.

$SI = 675 \times 8.4 \times 5 / 100 = 675 \times 42 / 100 = 28350 / 100$.

Therefore $SI = 283.50$.

Hence, **Rs 283.50.**

53. Answer: a

Explanation:

Count the triangles systematically by moving from the smallest triangles to the largest ones. First list every single unit triangle formed by the innermost lines of the figure.

Then add the triangles formed by combining two units, then three units, and so on until every possible triangle has been counted exactly once. Adding all these counts across the different sizes gives a total of 16 triangles in the figure.

Hence, **16.**

54. Answer: c

Explanation:

Cheriyal is a stylised version of the Nakashi art tradition of scroll painting, native to Cheriyal village in the Warangal region of the present state of Telangana.

Traditionally painted on khadi cloth treated with tamarind seed paste and rice starch, the scrolls narrated stories from local caste folklore and epics like the Mahabharata and Ramayana.

The Cheriyal scroll painting has been granted a Geographical Indication tag associated with Telangana. Andhra Pradesh, Madhya Pradesh and Karnataka each have their own folk painting traditions such as Kalamkari, Gond and Mysore, but Cheriyal specifically belongs to Telangana.

Hence, **Telangana**.

55. Answer: a

Explanation:

Position of the hour hand at 2:37: it moves 30 degrees per hour and 0.5 degrees per minute, so it stands at $2 \times 30 + 37 \times 0.5 = 60 + 18.5 = 78.5^\circ$ from 12.

Position of the minute hand at 37 minutes: it moves 6 degrees per minute, so it stands at $37 \times 6 = 222^\circ$ from 12. The angle between the two hands is $222 - 78.5 = 143.5^\circ$, and since this is less than 180° it is already the smaller angle.

Hence, 143.5° .

56. Answer: d

Explanation:

Jagdish Mukhi is a veteran BJP leader and former Delhi legislator who served in various constitutional posts after retiring from active state politics. In October 2017, he was sworn in as the Governor of Assam, taking oath at a ceremony held at Raj Bhavan in Guwahati.

Before this posting he had been the Lieutenant Governor of Andaman and Nicobar Islands. Satya Pal Malik was appointed Governor of Bihar and later Jammu and Kashmir, P. Sathasivam was Governor of Kerala and K. Sankaranarayanan had earlier served in states like Maharashtra, so none of them took oath as Governor of Assam in October 2017.

Hence, **Jagdish Mukhi**.

57. **Answer: a**

Explanation:

Cellular respiration is the biochemical process in which glucose taken from food is oxidised inside the cell, generally in presence of oxygen, to release the chemical energy stored in its bonds; this energy is captured as ATP by the reaction $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{energy}$.

Oxygen is only the oxidising agent, not the fuel; hydrogen and lead are not respiratory substrates in the body, so it is the burning of glucose that supplies energy during respiration.

Hence, **Burning of glucose**.

58. **Answer: a**

Explanation:

To find the square root of 8281, look for an integer n such that $n^2 = 8281$.

Since $90^2 = 8100$ and $100^2 = 10000$, the root lies between 90 and 100 and ends in 1 or 9 (unit digit 1).

Checking, $91 \times 91 = 8281$ exactly.

Therefore $\sqrt{8281} = 91$.

Hence, **91**.

59. Answer: a

Explanation:

The energy possessed by a body by virtue of its motion is called kinetic energy, and for a body of mass m moving with velocity v its magnitude is given by $KE = \frac{1}{2}mv^2$; a stationary body has no kinetic energy.

Thermal energy is the internal energy due to the random motion of molecules of a body, potential energy is the stored energy of position or configuration and light energy is the energy carried by electromagnetic waves, so only kinetic energy is directly tied to bulk motion.

Hence, **Kinetic energy**.

60. Answer: a

Explanation:

Read the innermost region of the Venn diagram, which represents the students who like all three sports A, B and C at the same time. This central overlap is the only region that satisfies membership in every one of the three sets.

The number written inside this triple overlap of the given diagram is 5, and that is the count of students who like to play all three sports out of the total group of 77

students.

Hence, 5.

61. Answer: d

Explanation:

Photosynthesis is the biochemical process in which green plants prepare food by using carbon dioxide and water in the presence of chlorophyll, and the energy that drives this synthesis is captured directly from sunlight, i.e. solar energy.

Thermal, kinetic and potential energy are not absorbed by chlorophyll pigments to convert CO_2 and H_2O into glucose, so they cannot power photosynthesis; only solar radiation of visible wavelengths is used.

Hence, **Solar energy**.

62. Answer: a

Explanation:

The Crystal Award is presented every year at the opening ceremony of the Annual Meeting of the World Economic Forum in Davos to leading cultural figures whose work has helped improve the state of the world. At the 2018 edition of the WEF Annual Meeting held on 22 January in Davos, Bollywood superstar Shah Rukh Khan received the Crystal Award for his leadership in championing children's and women's rights in India through the Meer Foundation.

Cate Blanchett and Elton John were the other two Crystal Award recipients that year. Narendra Modi, Raghuram Rajan and Sundar Pichai are prominent Indians but were not chosen for this specific award at that edition of the forum.

Hence, **Shah Rukh Khan**.

63. Answer: c

Explanation:

Split the series into a number part and a letter part. The numbers are 21, 24, 27, which increase by 3 each time, so the next number is $27 + 3 = 30$.

The letters are C, F, I, which advance by three positions each time in the alphabet since C to F and F to I are three step jumps. The next letter is $I + 3 = L$. Combining the two, the next term is 30L.

Hence, 30L.

64. Answer: c

Explanation:

The angle of depression from the top of the tower equals the angle of elevation from the base of the building.

Let d be the horizontal distance between the tower and the building; the tower height is $62\sqrt{3}$ m.

$$\tan 60^\circ = \frac{\text{height}}{\text{distance}}, \text{ so } \sqrt{3} = \frac{62\sqrt{3}}{d}.$$

$$\text{Solving, } d = \frac{62\sqrt{3}}{\sqrt{3}} = 62 \text{ m.}$$

Hence, 62 m.

65. Answer: b

Explanation:

Ductility is the ability of a metal to be drawn into thin wires, and among all metals gold has the greatest ductility—a single gram of gold can be drawn into a wire nearly two kilometres long without breaking.

Silver is the second most ductile metal, tungsten is used for filaments because of its high melting point rather than its ductility, and iron is far less ductile than either silver or gold, so gold is the most ductile metal.

Hence, **Gold**.

66. Answer: d

Explanation:

Each term has four symbols: a slash, $\pm$, a box and $*$. From one term to the next, the last symbol moves to the front and the slash flips direction ($/$ becomes $\backslash$ and back).

$/\pm\Box*$ gives $*\backslash\pm\Box$ ($*$ moves to the front, $/$ becomes $\backslash$); $*\backslash\pm\Box$ gives $\Box*/\pm$ ($\Box$ moves to the front, $\backslash$ becomes $/$).

Applying the same rule to $\Box*/\pm$ moves $\pm$ to the front and flips $/$ to $\backslash$, giving $\pm\Box*\backslash$, which is figure D.

Hence, D.

67. Answer: b

Explanation:

Angiosperms are divided on the basis of the number of cotyledons in the seed embryo into monocotyledons (one cotyledon) and dicotyledons (two cotyledons); water spinach or kalmi (*Ipomoea aquatica*) belongs to the family Convolvulaceae and its seeds are dicotyledonous.

Deodar and pine are gymnosperms in which the seed generally has many cotyledons, and ulva is a green alga that does not even produce seeds, so among the options only water spinach seeds have two cotyledons.

Hence, **Water spinach (Kalmi)**.

68. Answer: a

Explanation:

The modern or long-form periodic table is based on Moseley's periodic law that properties of elements are a periodic function of their atomic number; in this table the horizontal rows are called periods and there are seven such periods numbered 1 to 7.

The vertical columns are called groups and there are eighteen groups numbered 1 to 18, which cover the s-, p-, d- and f-blocks, so the modern periodic table has 7 periods and 18 groups.

Hence, **7 periods and 18 groups**.

Your Personal Exams Guide

69. Answer: d

Explanation:

The idea that matter can be divided again and again into smaller and smaller particles was put forward in ancient India by Maharishi Kanad, who called the smallest indivisible particle 'parmanu'.

Democritus was a Greek philosopher, while Dalton (atomic theory, 1808) and Lavoisier (conservation of mass) were modern European scientists, so none of them is the ancient Indian philosopher asked for.

Hence, **Kanada**.

Note: RRB did not award marks for this question in the official key.

70. **Answer: a**

Explanation:

The atomic number of an element, denoted Z , is defined as the number of protons present in the nucleus of one of its atoms; in a neutral atom the number of electrons is equal to the number of protons, so Z also represents the number of electrons.

An isotope is one of several forms of an element with the same Z but different mass numbers, atomic weight is the average mass of an atom in unified atomic mass units and mass number is the total count of protons plus neutrons, none of which equals just the electron or proton count.

Hence, **Atomic number**.

Note: RRB did not award marks for this question in the official key.

71. **Answer: a**

Explanation:

Pressure is defined as force per unit area, and in SI units force is measured in newton and area in square metre, so the SI unit of pressure is newton per square metre; this derived unit is given the special name pascal (Pa) in honour of Blaise Pascal.

Watt is the SI unit of power, joule is the SI unit of work or energy and newton is the SI unit of force, so none of these represents pressure directly; only pascal does.

Hence, **Pascal**.

72. Answer: a

Explanation:

Write 128 as a power of 2: $128 = 2^7$.

The n th root of 128 is $2^{7/n}$; this is rational only when $7/n$ is an integer.

Among the given roots, only $n = 7$ gives an integer exponent, so $128^{1/7} = 2$.

The others give irrational values $2^{7/3}$, $2^{7/5}$ and $2^{7/4}$.

Hence, $\sqrt[7]{128}$.

73. Answer: a

Explanation:

A lateral mirror image reverses the order of the letters and flips each letter left to right.

Reversing MAT gives the order T, A, M. The letters M, A and T are each symmetric about a vertical line, so flipping them leaves their shapes unchanged.

The mirror image therefore reads TAM in normal letter shapes, which is the figure labelled B.

Hence, B.

74. Answer: c

Explanation:

Given $123 \times 456 = 56088$.

0.123 has three digits after the decimal and 0.0456 has four digits after the decimal, total seven decimal places.

So $0.123 \times 0.0456 = 56088$ with the decimal point placed so there are seven digits after it.

That gives 0.0056088.

Hence, **0.0056088**.

75. Answer: b

Explanation:

Shantha Rangaswamy is a pioneering Indian women's cricketer who captained the national side in the late 1970s and became the first Indian woman to score a Test century. At the BCCI Annual Awards for Women held in Bengaluru in March 2017, she was honoured with the BCCI Lifetime Achievement Award for her outstanding contribution to women's cricket in India.

The other three players Diana Edulji, Shubhangi Kulkarni and Purnima Rau are also legends of Indian women's cricket, but at this particular edition of the ceremony, the Lifetime Achievement award was conferred on Shantha Rangaswamy.

Hence, **Shantha Rangaswamy**.

76. Answer: a

Explanation:

Let Pipe B fill the cistern in $5t$ hours; then Pipe A takes $\frac{2}{5} \times 5t = 2t$ hours and Pipe C takes $3 \times 2t = 6t$ hours.

All three together fill the cistern in 15 hours, so $\frac{1}{2t} + \frac{1}{5t} + \frac{1}{6t} = \frac{1}{15}$.

LCM of 2, 5, 6 is 30, giving $\frac{15}{30t} + \frac{6}{30t} + \frac{5}{30t} = \frac{26}{30t} = \frac{1}{15}$.

So $30t = 26 \times 15 = 390$, giving $t = 13$. Then $A = 26$ h and $C = 78$ h.

Without B, rate = $\frac{1}{26} + \frac{1}{78} = \frac{3}{78} + \frac{1}{78} = \frac{4}{78} = \frac{2}{39}$, so time = $\frac{39}{2} = 19.5$ hours.

Hence, **19.5**.

77. Answer: b

Explanation:

A quadratic $ax^2 + bx + c = 0$ has repeated (equal) roots when its discriminant $b^2 - 4ac = 0$.

Here $a = 2$, $b = k$ and $c = 1.25k$, so discriminant = $k^2 - 4 \times 2 \times 1.25k = k^2 - 10k$.

Setting $k^2 - 10k = 0$ gives $k(k - 10) = 0$.

Therefore $k = 0$ or $k = 10$.

Hence, $k = 10$ or $k = 0$.

Your Personal Exams Guide

78. Answer: d

Explanation:

In the 2017 elections to the 117-member Punjab Legislative Assembly, the Indian National Congress secured a decisive majority by winning 77 seats. Captain Amarinder Singh, the state Congress chief, was sworn in as the Chief Minister of Punjab after this verdict.

The Aam Aadmi Party emerged as the principal opposition with 20 seats, while the ruling Shiromani Akali Dal and its ally the Bharatiya Janata Party were reduced to 15

and 3 seats respectively. Thus among the given options, the party with the maximum number of seats in the Punjab Assembly Elections 2017 was the Indian National Congress.

Hence, Indian National Congress.

79. Answer: a

Explanation:

Examine the given assembled figure and identify the individual sub-shapes visible inside it. Match each visible sub-shape with one of the smaller figures labelled A, B, C, and D provided as pieces.

The pieces that fit inside the assembled figure are the shapes labelled A, B and D, since their outlines together reproduce every part of the assembled figure with no overlap missing or extra shape appearing.

Hence, A, B and D.

80. Answer: c

Explanation:

Selling price = cost price $\times$ (1 + profit percent / 100).

Cost price = 185 and profit = 18 percent, so multiplier = 1.18.

Selling price = $185 \times 1.18 = 218.30$.

Hence, Rs 218.30.

81. Answer: c

Explanation:

A alone finishes the work in 2.5 days, so A's rate is $\frac{1}{2.5} = \frac{2}{5}$ per day; B's rate is $\frac{1}{7.5} = \frac{2}{15}$ per day.

Together they do $\frac{2}{5} + \frac{2}{15} = \frac{6}{15} + \frac{2}{15} = \frac{8}{15}$ per day.

A left 5.5 days before the end, so B alone did the last stretch and finished $5.5 \times \frac{2}{15} = \frac{11}{15}$ of the work solo.

The joint portion is $1 - \frac{11}{15} = \frac{4}{15}$; time A worked = $\frac{4/15}{8/15} = \frac{4}{8} = 0.5$ days.

Hence, **0.5**.

82. Answer: d

Explanation:

The Theatre Olympics is an international theatre festival that brings together major stage productions and directors from across the world. It was founded in Delphi, Greece in 1993 by the celebrated Greek theatre director Theodoros Terzopoulos along with a founding committee of eight other leading theatre practitioners including Heiner Muller, Robert Wilson and Yuri Lyubimov.

India hosted the 8th edition of the Theatre Olympics in 2018 across seventeen cities. Alexis Damianos, Theo Angelopoulos and Constantine Giannaris are noted Greek film and stage figures but they were not the founder-director behind this specific festival.

Hence, **Theodoros Terzopoulos**.

83. Answer: d

Explanation:

Examine the code by comparing TAM with RYK: $T - 2 = R$, $A - 2 = Y$ (with wrap around the alphabet), and $M - 2 = K$. Every letter is shifted two positions backward in the English alphabet.

Apply the same rule to HIS: $H - 2 = F$, $I - 2 = G$ and $S - 2 = Q$. Combining the coded letters gives the word FGQ.

Hence, **FGQ**.

84. Answer: b

Explanation:

After a sugarcane crop is harvested by cutting the standing cane at ground level, the stubble that is left behind sprouts fresh shoots from its underground buds and gives a second (and sometimes third) crop without replanting; this practice and the resulting crop are known as a ratoon or 'pedi' crop.

Jhum is the shifting slash-and-burn cultivation practised in north-east India, mixed cropping is growing two or more crops together on the same field and subsistence farming aims to feed only the farmer's family, so none of them describes the sugarcane regrowth crop.

Hence, **Ratoon (Pedi)**.

85. Answer: a

Explanation:

Apply BODMAS to $48 \div 4 \times (20 - 25 \div 5) \div 3$.

Resolve the bracket first: $25 \div 5 = 5$, so $20 - 5 = 15$.

The expression becomes $48 \div 4 \times 15 \div 3$.

Left to right: $48 \div 4 = 12$, then $12 \times 15 = 180$, then $180 \div 3 = 60$.

Hence, **60**.

86. Answer: a

Explanation:

The magnitude of the electric charge carried by a single electron is one of the fundamental physical constants and its accepted value is $1.6 \times 10^{-19} \text{ C}$ (more precisely $1.602 \times 10^{-19} \text{ C}$); this value was first measured accurately by Millikan in his oil-drop experiment.

The other options either have a positive exponent (making the charge unrealistically large) or a wrong exponent, so they cannot represent the tiny elementary charge on an electron.

Hence, $1.6 \times 10^{-19} \text{ C}$.

87. Answer: d

Explanation:

In plant taxonomy the standard hierarchical arrangement of taxa in descending order goes from the broadest to the narrowest category as: Division (or Phylum), Class, Order, Family, Genus and Species, so each higher category includes all the lower ones under it.

The other sequences place Order before Class or Family before Order, both of which break the accepted rank order laid down by Linnaean taxonomy, so only Division → Class → Order → Family → Genus → Species is correct.

Hence, Division, Class, Order, Family, Genus, Species.

88. Answer: d

Explanation:

The famous Pinjore Garden, also called Yadavindra Gardens, is located at Pinjore in the Panchkula district of Haryana, on the Chandigarh–Shimla highway, very close to the city of Chandigarh. It was laid out in the seventeenth century by Fidai Khan, a foster brother of the Mughal emperor Aurangzeb, and later restored by Maharaja Yadavindra Singh of Patiala, whose name it now bears.

The garden is a classic example of Mughal char bagh style with terraces, water channels and pavilions such as Shish Mahal and Rang Mahal. Bangalore, Delhi and Srinagar have their own famous gardens but none of them is the site of the Pinjore Garden.

Hence, Chandigarh.

89. Answer: d

Explanation:

Compare the given pattern with the four options by looking at the arrangement of shapes, the direction of shading, and the position of every internal mark. A matching pattern must reproduce all of these features exactly.

The option labelled C is the one whose arrangement, shading direction and mark positions repeat those of the given figure exactly, while the other three options differ in at least one small feature such as a rotated element or reversed shading.

Hence, C.

90. Answer: c

Explanation:

Captain William Hawkins was an English navigator and representative of the English East India Company who arrived at the Mughal court seeking permission for the Company to trade in India. He reached the court of the Mughal emperor Nuruddin Muhammad Jahangir at Agra in 1609 and stayed there for about three years, during which he was granted a mansab and a personal audience with the emperor.

Although he could not secure a favourable trade treaty because of Portuguese influence, his visit paved the way for later English embassies such as that of Sir Thomas Roe. Chandragupta, Bahadur Shah and Ashoka belonged to entirely different periods and did not receive Hawkins.

Hence, **Jahangir**.

91. Answer: d

Explanation:

The two mixtures are combined in the quantity ratio 3 : 2, i.e. 3 parts of the first mixture with 2 parts of the second.

First mixture (water : syrup = 5 : 2): water fraction $\frac{5}{7}$, syrup fraction $\frac{2}{7}$. Second mixture (7 : 4): water $\frac{7}{11}$, syrup $\frac{4}{11}$.

$$\text{Water} = 3 \times \frac{5}{7} + 2 \times \frac{7}{11} = \frac{165+98}{77} = \frac{263}{77}.$$

$$\text{Syrup} = 3 \times \frac{2}{7} + 2 \times \frac{4}{11} = \frac{66+56}{77} = \frac{122}{77}.$$

So water : syrup in the combined mixture = 263 : 122.

Hence, 263:122.

92. Answer: d

Explanation:

$$\text{Given } \cot \alpha = \sqrt{3} + \sqrt{2}; \text{ then } \tan \alpha = \frac{1}{\sqrt{3} + \sqrt{2}}.$$

$$\text{Rationalise: } \tan \alpha = \frac{\sqrt{3} - \sqrt{2}}{(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})} = \frac{\sqrt{3} - \sqrt{2}}{3 - 2} = \sqrt{3} - \sqrt{2}.$$

$$\text{Therefore } \tan \alpha - \cot \alpha = (\sqrt{3} - \sqrt{2}) - (\sqrt{3} + \sqrt{2}) = -2\sqrt{2}.$$

$$\text{Hence, } -2\sqrt{2}.$$

93. Answer: c

Explanation:

Venu earns ₹ 2000 per day and sets aside 5 percent of that as daily donation.

$$\text{Daily donation} = 5\% \text{ of } 2000 = \frac{5}{100} \times 2000 = 100, \text{ i.e. ₹ } 100.$$

$$\text{Over 15 days donation} = 100 \times 15 = 1500, \text{ i.e. ₹ } 1,500.$$

$$\text{Hence, ₹ } 1,500.$$

94. Answer: b

Explanation:

Interpret X's statement step by step. His wife's daughter is his own daughter (or step-daughter). The man in the photograph is described as the husband of that daughter, which makes the man in the photograph X's son-in-law.

Since X is the father of the woman whose husband is in the photograph, X is the father-in-law of the man seen in the photograph.

Hence, **Father-in-law**.

95. Answer: b

Explanation:

Each frame is a box divided into four cells, holding a smiley face and an 'oo' sign.

The smiley moves one cell clockwise each step (top-right, bottom-right, bottom-left) and also turns through 90 degrees, so its mouth goes from the bottom, to the left, to the top.

The 'oo' sign also moves one cell clockwise each step (top-left, top-right, bottom-right).

In the next frame the smiley must be in the top-left cell with its mouth on the right, and the 'oo' in the bottom-left cell. Figure D matches; figure C has the mouth on the left.

Hence, D.

96. Answer: c

Explanation:

Statement 1 alone gives only that Neetu is the tallest; it says nothing about the order of the other three. Statement 2 alone gives Tina > Priya but not their absolute position. Statement 3 alone gives Manu > Tina but no complete order. Any pair of these still leaves the ordering incomplete for the shortest position.

Taking all three together: Neetu is tallest, Manu > Tina, and Tina > Priya, so the order tallest to shortest is Neetu, Manu, Tina, Priya, and Priya stands last. All three statements are needed.

Hence, **Statements 1, 2 and 3 together are sufficient.**

97. Answer: a

Explanation:

Draw the sets. Leaves and rice are both subsets of trees, but with no direct relation between leaves and rice; therefore we cannot conclude that some leaves are rice, so conclusion 1 does not follow.

All leaves are trees can be converted to some trees are leaves, so conclusion 2 follows. Some wheat are rice combined with all rice are trees gives some wheat are trees, which converts to some trees are wheat, so conclusion 3 follows too.

Hence, **Only conclusions 2 and 3 follow.**

98. Answer: c

Explanation:

A strong argument must be directly relevant to the statement and must offer a substantial reason. Argument I merely dismisses playgroup as unnecessary without giving any reason why a strict five-year age rule would be beneficial for the child or the school, so it is weak.

Argument II speaks about lack of space in big cities but this is a general urban issue, not a specific reason for lowering the school admission age below five. The link to the statement is indirect, so this argument is also weak.

Hence, **Neither argument I nor argument II is strong.**

99. Answer: d

Explanation:

Split the given series into two alternating sub-series. The letters at the odd positions are N, M, L, which are consecutive letters going backward in the alphabet, so the next letter at the seventh position of the main series is K.

The letters at the even positions are A, B, C, which advance forward in the alphabet, and their next term would be D at the eighth position. Since the required term is the seventh, the answer is K.

Hence, K.

100. Answer: a

Explanation:

Shri Sudhanshu Biswas, a freedom fighter and Ramakrishna Mission monk from West Bengal, has spent decades running free schools, orphanages and health services for poor children in the Sundarbans region.

For this grassroots work he was conferred the Padma Shri 2018 in the field of Social Work from West Bengal. Jose Ma Joy and Yeshi Dhonden received Padma Shri 2018 in other fields and states, and Subadhani Devi is not the West Bengal Social Work awardee.

Hence, Shri Sudhanshu Biswas.